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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,220	03/22/2004	Sabina J. Houle	884.C30US2	3305
21186	7590	03/23/2005	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402			HUYNH, ANDY	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/807,220	Applicant(s) HOULE ET AL.	
	Examiner Andy Huynh	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-11 and 26-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-11 and 26-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 14, 2005 has been entered.

In the Amendment dated March 14, 2005, claims **1-6 and 12-25** are canceled, and claims **1, 28 and 36** are amended is acknowledged. Accordingly, claims **7-11 and 26-41** are currently pending in this application.

Response to Arguments

Applicant's arguments, see the Amendment, filed March 14, 2005, with respect to the rejection(s) of claim(s) **7-11 and 26-41** have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

Claim **36** is objected to because of the following reasons.

In line 6, "a semiconductor die" should read --a microelectronic die--, and "the depth of the cavity" should read --a depth of the cavity--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-9, 27, 28 and 32-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyuki (JP: 59188944), Applicant's submitted prior art (ASPA), in view of the specification of the invention.

Regarding claim 7, Hiroyuki discloses in Fig. 2 and the corresponding texts as set forth in English Abstract, a method of forming a heat spreader comprises:

forming a mass of material into a body/a cover (11) approximately rectangular in shape having a top surface, a bottom surface and at least one corner ; and

forming at least three downset legs on the mass of material/the cover, wherein the at least three downset legs are formed to be downset from the bottom surface and wherein the at least three downset legs and the bottom surface define a cavity for placement of a microelectronic die/a semiconductor part 12.

Hiroyuki fails to teach or suggest the cavity has a depth less than or equal to a thickness of the microelectronic die/the semiconductor part. However, see page 6, lines 25-27 of the present patent application, it is said that the depth of the cavity 120 may be less than or equal to the thickness of microelectronic die 106, but the claimed subject matter is not so limited, and may, for example, be greater than thickness of the microelectronic die 106. Therefore, it would

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have been an obvious matter of design choice to form the cavity has a depth less than or equal to a thickness of the microelectronic die, since applicant has not disclosed that the cavity having a depth less than or equal to a thickness of the microelectronic die solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the cavity has a depth greater than thickness of the microelectronic die.

Regarding claim 8, Hiroyuki discloses the claimed limitations except for the method wherein the forming a mass of material comprises at least one cold forming process. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use at least one cold forming process to form a mass of material since it was well known in the art as set forth in the specification, page 7, lines 19-23.

Regarding claims 9 and 27, Hiroyuki discloses in Fig. 2 wherein the method further comprises forming at least one notch on the mass of material, wherein the notch is formed in the vicinity of the corner; forming at least one notch formed between the top surface and the bottom surface proximate to the at least one corner.

Regarding claim 28, Hiroyuki discloses in Fig. 2 and the corresponding texts as set forth in English Abstract, a method of forming a heat spreader comprises:

forming a body/a cover (11) having a top surface, a bottom surface, at least one side and at least one corner;

forming at least three downset legs formed to be downset from the body bottom surface by a distance wherein the at least three downset legs and the body bottom surface define a cavity between the legs for placement of a microelectronic.

Hiroyuki fails to teach or suggest the distance being a depth less than or equal to a thickness of the microelectronic die/the semiconductor part. However, see page 6, lines 25-27 of the present patent application, it is said that the depth of the cavity 120 may be less than or equal to the thickness of microelectronic die 106, but the claimed subject matter is not so limited, and may, for example, be greater than thickness of the microelectronic die 106. Therefore, it would have been an obvious matter of design choice to form the distance has a depth less than or equal to a thickness of the microelectronic die, since applicant has not disclosed that the cavity having a depth less than or equal to a thickness of the microelectronic die solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the cavity has a depth greater than thickness of the microelectronic die.

Regarding claim **29**, Hiroyuki discloses in Fig. 2 the method wherein forming the body includes forming the body with four downset legs formed thereon, and wherein each downset leg is formed proximate to a separate corner of the heat spreader body/the cover.

Regarding claims **32 and 33**, Hiroyuki discloses in Fig. 2 the method wherein the body and at least one downset leg are comprised of thermally conductive material; and the method wherein the cavity is configured to receive at least one microelectronic die (12).

Regarding claim **34**, Hiroyuki discloses in Fig. 2 the method wherein forming the body includes forming the body in a rectangular shape.

Regarding claim **35**, Hiroyuki discloses the claimed limitations except for the method wherein forming the body includes forming the body in an octagon shape. It would have been an obvious to one having ordinary skill in the art at the time of the invention was made to choose the body in any shape, since applicant has not disclosed that the body being octagonal in shape

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solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with different shapes instead.

Regarding claim 36, Hiroyuki discloses in Fig. 2 and the corresponding texts as set forth in English Abstract, a method of forming a heat spreader comprises:

forming a body/a cover (11) having a top surface, a bottom surface, a periphery and at least one side in a shape having a plurality of corners;

forming a plurality of legs extending down from the bottom surface on the periphery of the body and thereby forming a semiconductor die cavity under the bottom surface of the body for placement of a semiconductor die, the plurality of legs being attached to a non-contiguous lip around the body; and

forming a notch between the top surface and the bottom surface in proximity to the at least one corner.

Hiroyuki fails to teach or suggest the depth of the cavity being less than or equal to a thickness of the microelectronic die/the semiconductor part. However, see page 6, lines 25-27 of the present patent application, it is said that the depth of the cavity 120 may be less than or equal to the thickness of microelectronic die 106, but the claimed subject matter is not so limited, and may, for example, be greater than thickness of the microelectronic die 106. Therefore, it would have been an obvious matter of design choice to form the cavity has a depth less than or equal to a thickness of the microelectronic die, since applicant has not disclosed that the cavity having a depth less than or equal to a thickness of the microelectronic die solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the cavity has a depth greater than thickness of the microelectronic die.

Regarding claims **37-39**, Hiroyuki discloses in Fig. 2 the method further includes attaching a microelectronic die (12) to the bottom surface of the bottom surface within the cavity; wherein forming a plurality of legs includes forming each of the plurality of legs in a corresponding one of the plurality of corners; and the method further includes forming a mechanical attachment mechanism in each of the plurality of corners.

Claims **10 and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable by Hiroyuki (JP: 59188944) in view of Domadia et al. (USP: 5,949,137 hereinafter referred to as "Domadia").

Hiroyuki discloses the claimed limitations except for the method wherein at least one void is formed on the at least one downset leg, wherein the void is configured to receive at least one mechanical attachment device. Domadia teaches in Fig. 2 the mounting holes (26) formed at the corners (28) of the heat spreader (15) of the flip chip packaging assembly. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to form the mounting holes at the corners of the heat spreader, as taught by Domadia to modify and incorporate into Hiroyuki's structure to form the claimed invention in order for receipt of mounting posts of the packaging assembly (see Domadia, column 2, lines 39-42).

Claims **11, 26 and 31** are rejected under 35 U.S.C. 103(a) as being unpatentable by Hiroyuki (JP: 59188944) in view of Tarter et al. (USP: 6,512,675, hereinafter "Tarter").

Regarding claim **11**, Hiroyuki discloses the claimed limitations except for the method wherein the at least one downset leg is formed to be configured to receive at least one clamp. Tarter teaches in Fig. 2 the heat sink-package assembly (100) comprising the clips (118), each of the clips (118) is snapped over the flanges (114) and (116). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize Tarter's teaching of the clip using in the heat sink-package assembly to modify and incorporate into Hiroyuki's structure to form the claimed invention in order to provide sufficient strength to hold the heat sink to the package lid/the heat spreader (see Tarter, column 3, lines 29-30).

Regarding claims **26 and 31**, Hiroyuki discloses the claimed limitations except for the method wherein the at least one downset leg is configured to receive at least one clip. Tarter teaches in Fig. 2 the heat sink-package assembly (100) comprising the clips (118), each of the clips (118) is snapped over the flanges (114) and (116). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize Tarter's teaching of the clip using in the heat sink-package assembly to incorporate into Hiroyuki's structure to form the claimed invention in order to provide sufficient strength to hold the heat sink to the package lid/the heat spreader (see Tarter, column 3, lines 29-30).

Claims **40 and 41** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroyuki (JP: 59188944) in view of Zuo et al. (USP: 6,525,420 hereinafter referred to as "Zuo").

Regarding claim **40**, Hiroyuki discloses the claimed limitations except for the method further includes forming a notch in the top surface of the body in each of the plurality of corners.

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Zuo teaches in Figs. 3 and 4 a lid heat spreader (20) comprises a notch/flange (25) formed in the top surface of the corner of the lid heat spreader. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to form a lid heat spreader comprising a notch/flange formed in the top surface of the corner of the lid heat spreader, as taught by Zuo, to incorporate into Hiroyuki's structure to form the claimed invention in order to support the lid heat spreader above the substrate and semiconductor device (see Zou, column 4, lines 30-32).

Regarding claim 41, Hiroyuki discloses in Fig. 2 the method wherein the top surface is approximately rectangular in shape.

Conclusion

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy Huynh, (571) 272-1781. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The Fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the -status of this application or proceeding should be directed to the receptionist whose phone number is (703) 308-0956.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Andy Huynh

Patent Examiner

Ah

03/18/05